Notes from The Eternal Arms Race

The arms race has changed a lot since 550 million years ago, when predation was slow and passive. There was no need for speed or protection at that time. Animal bodies were soft and spongy, and the animals ate their food as it floated by them. Next, animals developed **jaws, eyes** and **fins**, etc, enabling them to hunt for their food.

Armor (sea shells) was one protective shield that eventually was used against predators; **scale**s, like **chain-mail** were also used for protection. As a result, predators evolved with stronger jaws. Over time, armor, as a protective device, begins to slow down, and **speed** is the new weapon for catching prey and evading predators. Animals also evolved improved sensors, which beat out armor as a defense. Many were successful escape artists, however, **jaws** evolved that were even **more powerful** (sharks).

Over more time, **camouflage** evolved to allow animals to be **masters of disguise**. This was especially helpful against predators with poor vision. Another protective device that emerged was **mimicry**. Animals would appear like others who were poisonous or dangerous, so that their predators stayed away from them. The cuddle fish was able to mesmerize its prey with its **skin**, which appeared to be flashing. Later still, eyesight got even sharper. The portia spider's eyes, its main hunting tool, are like seeing machines**. Predatory weaponry and prey defenses are no longer passive as they used to be when there was little need for speed or protection.**

Co-Evolution- when animals pressure each other to change over time, due to the need to hunt or escape being hunted. The cheetah and gazelle have co-evolved in the race for survival that never ends. They are the first and second fastest animals on the African plains. The animals that were the fastest lived to produce offspring, which were also fast. The cheetah eventually got a little faster each time the gazelle increased its speed. Thus, they co-evolved as the fastest on the plains.

Predator Prey Relationships

Elephant vs. Lion
The elephant's protection is size. Being big is a winning attribute. Lion cannot overpower a healthy elephant, even though it is so fast.

Tadpole vs. Dragon Fly Larvae
If one tadpole is eaten by the larvae, its body emits chemicals to the siblings, which cause them to grow large, red tails and pack on the pounds. These tadpoles are harder to catch with these larger tails.

Portia Spider vs. Argiape
The portia's sharp **eye** is its main hunting tool. Portia mimics a struggling insect, and then pretends to give up; when the argiape is not fooled, Portia attacks.

Moths vs. Bats; Moths vs. Birds
Bats use sonar and echo-location to find moths. Moths evolved ear to detect the bat and swerve away. Then the bat acquired improved hearing with larger ears along with sonar. But the moth learned to stay still so the bat couldn't locate it.
One species of moth actually returned to being active during the day. This moth now has birds to worry about. The moth has evolved to have a taste that the bird dislikes.

Newt vs. Snake
The newt's orange belly is a warning that it can kill many of its enemies. The garter snake developed a resistance to the newt's poison, so over time the newt became more poisonous in order to kill the snake.